are accepted, and not only anonymous but self-contradictory ones. Mrs. Piper hypnotised, personated a French physician Dr. Phinuit, who did not know French, and failed to give a satisfactory account of himself. Mrs. Piper, during her trance as Dr. Phinuit, gabbled, made chance shots, "fished" for information, and was generally a transparent enough imposition. Yet she occasionally spoke of things she could not, according to the investigators, have obtained a knowledge of by ordinary means. For that they give her credit, and forgive all her failures. Prof. Lodge, apparently eager to believe, compares her utterances to the experience of anyone listening at a telephone: "you hear the dim and meaningless fragments of a city's gossip till back again comes the voice obviously addressed to you, and speaking with firmness and decision." Imagine in a real scientific inquiry an investigator pursuing a theory through a complicated series of observations, arbitrarily selecting those that advance his views, and calling the others "dim and meaningless until back comes the result obviously addressed to you!"

As one instance of the absence of scientific method from these discussions, take M. Richet's and Mr. Gurney's experiments with cards. In these experiments an agent looked at the card, and a percipient guessed the suit. M. Richet conducted 2927 trials, and 789 correct guesses were made, the theory of probability only granting 732. The S.P.R. trials numbered 17,653, with 4760 successes—347 in excess of the probable number. Now this is adduced by Mr. Podmore as evidence for telepathy; we are asked to believe that about once in sixty times—that is the excess above the probable ratio of successes—the mental impression of the agent recorded itself upon the brain of the percipient. Whether during the interval of fifty-nine trials telepathy was in abeyance, Mr. Podmore does not say, and the failure of the American S.P.R. to confirm these results he sets aside because the details of their experiments are not given—an excellent example to the sceptic. Are we to believe that only once in sixty times did the transferred thought surge up into consciousness, or that the transference occurs only at the sixtieth time, or what? A most obvious collateral test seems to have been altogether overlooked, namely, for someone to guess cards *before* the agent saw them, and so to ascertain how far pure haphazard guessing of this kind, or guessing on any particular gambler's "system," may fall away from the theory of probability. The deductions of the theory of probability, be it remembered, become certainties only when the number of cases is infinite. We have no grounds for assuming that in seventeen thousand or seventy thousand, or in any finite number of cases, facts come into coincidence with this theory. In an infinite number of sets of 17,653 trials we might have every possible divergence from the average result up to 17,653 successive failures or 17,653 successive successes. Taking a number of sets, they may be expected to fluctuate round a mean result in agreement with the theory of probability—that is all. These three sets of experiments manifestly prove nothing. And this is how Mr. Podmore prefaces his account of them: "In the following cases, where the exact nature of the impression received was not apparently classified by the percipient, it may be presumed to have been either of a visual or an auditory nature." He begs the question, and in a book addressed to the untrained mind of the general reader! Nothing could show more clearly the tendency of this psychical research to accept as evidence what is really not evidence at all, its lack of critical capacity and severe confirmatory inquiry, and the missionary spirit of its exposition.

Enough has been said to show the essential difference between "psychical" and scientific investigations, and to justify the attitude of scepticism. After all, that scepticism does nothing to hamper Mr. Podmore and his associates from collecting their evidence, clarifying their opinions, and building up such a defensible case as their peculiar circumstances permit. And be it remembered the scientific man of to-day occupies a responsible position, that he possesses even a disproportionate share of the public confidence, because of his reputation for sceptical caution. The public mind is incapable of the suspended judgment; it will not stop at telepathy. Any general recognition of the evidence of "psychical" research will be taken by the outside public to mean the recognition of ghosts, witchcraft, miracles, and the pretensions of many a shabby-genteel Cagliostro, now pining in a desert of incredulity, as undeniable facts. Were Mr. Podmore's case strong—and it is singularly weak—the undeniable possibility of a recrudescence of superstition remains as a consideration against the unqualified recognition of his evidence.

H. G. WELLS.

THE BEGINNINGS OF HISTORY.

The Dawn of Civilisation—Egypt and Chaldæa. By G. Maspero. Edited by A. H. Sayce. Translated by M. L. McClure. (London: Society for Promoting Christian Knowledge, 1894.)

AS the winter season advances, and folk begin to wend their way to Egypt, the enterprise of authors and publishers keeps up a steady supply of good literature concerning the country which, since the English occupation in 1882, has exercised upon people of all nations a fascination which may be described as marvellous. Only a few weeks ago an English translation of Dr. Erman's *Aegypten* appeared, and already we have before us a translation of a very important work by Prof. Maspero in the same language. Both works are excellent, but each is typical of the nationality of its writer, and is really addressed to a different class of readers. The work of Dr. Erman possesses a minuteness of detail characteristic of the true German student, laborious and accurate, while that of M. Maspero, though no less accurate, discusses facts on a large scale with due reference to everything which bears upon them, and contains generalisations which all thoughtful readers will accept with gratitude; added to this, we have the light and easy style and logical arrangement of facts and sentences which are the type of the work of the French master of his subject. In short, Dr. Erman's book will form a standard work of reference for the student of Egypt; but that of M. Maspero will take its place as a general history of early Oriental civilisation on the banks of the Nile, Tigris, and Euphrates, and in the countries which lie between.

The volume which we have in our hands, although it is nowhere stated in it, seems to be the first of a series which M. Maspero intends to devote to the history of the ancient nations of the East; and indeed the original French work began to appear in weekly numbers with the general title of *Histoire Ancienne des Peuples de l'Orient* some time ago. It is necessary to state this in order that the reader may not confuse the new work of M. Maspero with the small and older work, the first edition of which appeared in Paris so far back as 1875, for although both books run on the same lines, and have the same aim, and the smaller originated the idea of the larger, yet the scale of the new work has been so greatly increased that it practically forms a new and independent treatise on Oriental history and archæology. The first work ran through four editions at least, and was exceedingly popular; but the new work, with its beautiful illustrations, is intended to be in France what Rawlinson's "Ancient Monarchies" was in England.

M. Maspero divides the first volume of his history into two parts: the first treats of Egypt, and the second of Ancient Chaldæa, six chapters being devoted to the former subject, and three to the latter. A detailed description of the formation of Egypt as a land is followed by an account of the Nile and of its influence upon the history of the country and its people. The civilisation of Egypt, according to M. Maspero, sprang up in the country on the banks of the Nile, which was bounded by Gebel Silsila on the south, Buto in the Delta on the north, the mountain of Bakha on the east, and the mountain of Manu on the west. The origin of the people who produced it is difficult to trace, for the camp of Egyptologists is divided in opinion on the matter. Many scholars hold that the Egyptians came from Asia, but not all who are of this opinion agree as to the route followed by them into Egypt. Some would have them enter Egypt by the Isthmus of Suez, and having gained possession of the Delta, make their way up to Memphis, Heliopolis, and further south; others would have them cross the Red Sea to Kosseir and so thence to Coptos, and thus account partially for the traditions which made Abydos in Upper Egypt the oldest city in Egypt; and again, others would make them cross over from the Arabian Peninsula by the Straits of Bâb el-Mandeb into Africa, and skirting the Abyssinian mountains, enter Egypt from the south. The first theory holds water so long as we assume that the Egyptians made their way from the East by the old trade routes into Egypt through Syria; in fact, this would be their only way if they set out from countries on about the same parallel of latitude as Babylon, for the want of water in the desert between the Euphrates and Egypt has from time immemorial made the route impossible even for the armies of mighty kings, and every invasion of Egypt by peoples from this region has been made by the way of northern Syria. The second theory makes it necessary for the emigrants from Asia to have crossed the waterless desert in the Arabian Peninsula, and to have built boats sufficiently large to cross the Red Sea; this appears to be the most improbable of all the theories yet put forth. The third theory has much in its favour, for the passage across the Straits of Bâb el-Mandeb would be easy, and the distance from shore to shore was probably less in those days than now. There exists yet another theory, however, as to the Asiatic origin of the Egyptians. In a paper read at the Oriental Congress in 1892, Dr. Hommel boldly asserted that the Egyptian civilisation was derived from that of Babylon, and he attempted to prove that the names of the gods of the one country were but slightly modified forms of those of the others. Egyptologists have not, up to the present, accepted this theory. A still more remarkable theory is that of Reinisch, who believes that Asiatics, Europeans and Africans spring from one family, whose original home was in the heart of Africa, near the great equatorial lakes. M. Maspero does not accept the theory of an Asiatic origin, but rather believes that the Egyptian

> "population presents the characteristics of those white races which have been found established from all antiquity on the Mediterranean slope of the Libyan continent; this population is of African origin, and came to Egypt from the west or south-west. In the valley, perhaps, it may have met with a black race which it drove back or destroyed; and there, perhaps, too, it afterwards received an accretion of Asiatic elements, introduced by way of the isthmus and marshes of the Delta."

The caution with which M. Maspero puts forth this theory shows that he has some doubts about it, and, indeed, leaves the question exactly where it was. As to the relationship between the Semitic languages and the language of the hieroglyphics, he has no doubt that at one time they all belonged to the same group; the latter, however, separated from the former very early, "at a time when the vocabulary and the grammatical system of the group had not as yet taken definite shape." This is an important pronouncement for an Egyptologist to make, and although it was said long ago by Semitic scholars, it is none the less welcome since it comes from one of the first Egyptologists of our times. Passing from the origin of the people to their religion and manners and customs, M. Maspero concisely and graphically describes their gods and mythology, and the beliefs which swayed the minds of the Egyptians for several thousands of years. The size of M. Maspero's work and the limits of a brief article absolutely preclude the possibility of noticing many new points in these subjects, which are admirably described, and we rapidly pass from the account of the political constitution of Egypt to the historical section of this division of the book, which treats of the first fourteen dynasties.

The second part of the volume follows the plan of the first, and sets out by describing the country, people, gods, &c., of the ancient Chaldæans, or more properly Babylonians, and the chapter which treats of their ideas concerning the Creation is of considerable interest. In this M. Maspero has rightly relied upon Jensen's epoch-marking book, "Die Kosmologie der Babylonier," for information, but it is to be regretted that Zimmern's translations of the "Creation" and other tablets were not published in time to be used by him. M. Maspero is, however, the first to describe popularly the excellent results achieved by Jensen in a subject which before he treated it was truly chaos. Passing to historical times, M. Maspero describes the foundation of the Babylonian empire, basing all his statements upon a series of works by Assyriological authorities, and cleverly harmonising their various opinions. The chapter on the Chaldæan civilisation is interesting, and is full of curious information. The volume is concluded by an appendix treating of the Pharaohs of the Ancient and Middle Empires, and by a useful index. M. Maspero is fortunate in having found so careful a translator as Mrs. McClure, who introduces her work in a preface which is at once business-like and to the point. The editor's remarks are, however, somewhat rambling, and in professing to criticise M. Maspero's knowledge of matters Egyptian or Babylonian, we think greatly out of place.

THE TRANSMISSION OF POWER.

On the Development and Transmission of Power. By William Cawthorne Unwin, F.R.S. (London: Longmans, Green, and Co., 1894.)

IT is well known that the author of this work has had special opportunities for studying the subject of transmission of power by all the various methods which have, at different times, been adopted, and the engineering world is to be congratulated on having received from his pen a summary of the principles utilised in this class of work, and of the possibilities of the future, as well as very complete and authentic information about the principal work that has been done in the past. This book is the outcome of a course of "Howard" lectures delivered before the Society of Arts in 1893. It deals with the generation, storage, and transmission or distribution of power. The methods of transmission and distribution include water under pressure, compressed air, wire ropes, steam, gas and electricity. The author recognises the fact that transmission of power to distances has not been so fully developed in the past as it is likely to be shortly, and that the electrical transmission and distribution of power has more to claim in the way of promises for the future than large achievements in the past.

The first chapters deal with the generation and the cost of generating power by steam or hydraulically. One of the most valuable parts of the book is found in those chapters where the economy of steam engines is considered. These chapters deal with the losses in boiler and engine in a very complete manner. The author has realised very fully the fact that in any case of generating power in large quantities, and distributing it to small consumers, the cost of the horse power depends largely upon the load curves at different times of the day, and he draws attention to the very large excess of cost per horse power of electric lighting stations over those which are delivering power at a constant rate. Even in a pumping station where the work is continuous, he finds that about 35 per cent. more fuel is required than in a careful trial, but in a station from which electric light or power is distributed, the losses due to banking of boilers and to engines working a portion of their time at an output which is not economical, are such that the quantity of fuel used per indicated horse power rises from 1½ lbs. per hour in a test trial with a condensing engine, to 3·3 lbs. under the special circumstances. The relative advantages of the condensing and non-condensing engines of the simple, compound, and triple expansion engines, of the steam-jacketing and superheating, are all discussed admirably. Some pages also are devoted to the utilisation of house refuse as a fuel, and the Halpin system of thermal storage receives some attention.

Some of the most important cases of utilising water power are also discussed. It will surprise many readers to find that even in 1876, 70,000-horse power was generated for manufacturing purposes from waterfalls in Switzerland, and that in the United States in 1880, 36 per cent. of the power used in manufacturing was water power, and only 64 per cent. steam power.

Among the chapters devoted to transmission of power, the most important, as pertaining more especially to the author's experience, are those on hydraulic and compressed air transmission. But in all branches of the subject, not only are the general principles dealt with, but there is to a pretty full extent a recapitulation of what has already been done. The London Hydraulic Power Company is taken as the best example of hydraulic transmission, but Liverpool, Birmingham and Manchester are also referred to, whilst most interesting accounts of the hydraulic supply at Zurich and Geneva are given. The principles of pneumatic distribution are very completely described, and the author has certainly made out the case that when these principles are properly applied, this system of distribution deserves more consideration than is generally accorded to it. Naturally the Paris distribution by this method is dealt with very fully, but other examples of interest are added. With regard to the distribution of power by steam, the most important case is that of New York, which Dr. Emery started in 1881. Eight pages upon gas distribution for power purposes are well worth some study, whether with regard to manufactured gas, or the natural gas supply in Pennsylvania. Whilst compressed air receives the author's attention to the extent of forty-eight pages, electrical distribution is by no means so well favoured; but the author explains that, in the first place, it is not his own speciality, and, in the second place, there are at the present moment few cases of electrical transmission combined with a complete system of distribution in a town. A chapter is at the end devoted to the great work which is now approaching its full development at Niagara Falls.

This short review cannot pretend to give an adequate idea of the contents or value of Prof. Unwin's book. Regarding the merits of the work generally, it is sufficient to say, first, that throughout it is written with the utmost fairness and impartiality; and secondly, that if any engineer were planning a system of transmission and distribution of power in any special case, he would be labouring under very considerable disadvantages if he had not first consulted this latest and most complete work on the development and transmission of power. G. F.

OUR BOOK SHELF.

A Treatise on Hygiene and Public Health. By Thomas Stevenson, M.D., F.R.C.P., and Shirley F. Murphy. (London: J. and A. Churchill, 1894.)

THIS volume is devoted to the subject of sanitary law, and it well maintains the all-round excellence of the two volumes that preceded it. Health officers will welcome the appearance of such a lucid and comprehensive digest of the law relating to the public health in England and Wales, Ireland and Scotland.

During comparatively recent years an immense amount